VI. RESTORING THE ECOSYSTEM

Since the Euro-American settlement of the Sacramento Valley, the natural ecosystem along the Sacramento River has been greatly changed. The flow regime of the river has been greatly altered and over ninety percent of the riparian forest has been removed. Nonnative, invasive plant and animal species now compete for limited space and resources. Agriculture has become the dominant land use in the use in the entire Sacramento Valley and development in the watershed has modified the quality and quantity of runoff.

These changes have substantially impacted the habitats and animal species of the Colusa Subreach. Numerous animal species have been extripated from the area and numerous species are now listed as "Endangered", "Threatened" or of "Special Concern" through state and federal Endangered Species Acts. This situation has led to strong statements of public concern and responses through legislation and funding initiatives. Political responses to these concerns have included SB 1086, which was the precursor of the SRCAF, the Central Valley Public Improvement Act and the CALFED Bay-Delta Program.

In California, voters have authorized substantial amounts of funding for water supply, water quality, recreation, wildlife habitat conservation and related programs through ballot initiatives in recent years. It has been noted that, while these initiatives have passed statewide, the majority of the voters in Colusa and Glenn Counties voted against these initiatives by substantial margins. To clarify that point, Table 7 is provided below. It details the results of four initiative propositions that have provided funding for a wide range of activities that included wildlife habitat conservation in recent years.

Table 7. California Ballot Initiative Results

Initative	Year	Colusa County		Glenn County		Statewide	
		Yes	No	Yes	No	Yes	No
Proposition 12	2000	38%	62%	36%	64%	63%	37%
Proposition 13	2000	47%	53%	44%	56%	65%	35%
Proposition 40	2002	31%	69%	24%	76%	57%	43%
Proposition 50	2002	26%	74%	23%	77%	55%	44%

Source: California Secretary of State, Elections Division

This Chapter reviews the ecosystem restoration policy that has been adopted for the larger Sacramento River corridor from Red Bluff to Colusa. This information is intended to provide a context for determining a restoration strategy for the Colusa Subreach. CSP is based on the concept that a broad ecosystem restoration strategy that is integrated with agriculture, public recreation, flood control and other uses of the Subreach will best serve all interests: the local community, the entire state and the wildlife resource. It is recognized that a balance between ecosystem

health and economic health is a necessary element of an effective ecosystem restoration strategy.

A. CALFED Ecosystem Restoration Goals

The CALFED Bay-Delta Program addresses the entire Sacramento – San Joaquin Delta watershed which includes the Colusa Subreach. It focuses on the four objectives of Water Supply Reliability, Water Quality, Levee System Integrity and Ecosystem Restoration. Ecosystem Restoration is also one of the eleven Program Elements of the CALFED Program. The Ecosystem Restoration Program Element is oriented to achieve six Goals for the entire Bay-Delta system:

1. Recover 19 at-risk native species and contribute to the recovery of 25 additional species.
2. Rehabilitate natural processes related to hydrology, stream channels, sediment, floodplains and ecosystem water quality.
3. Maintain and enhance fish populations critical to commercial, sport and recreational fisheries.
4. Protect and restore functional habitats, including aquatic, upland and riparian, to allow species to thrive.
5. Reduce the negative impacts of invasive species and prevent additional introductions that compete with and destroy native species.
6. Improve and maintain water and sediment quality to better support ecosystem health and allow species to flourish.

Colusa Subreach Planning was funded as part of the Ecosystem Restoration Program to help meet these Goals. Involving stakeholders and addressing landowner concerns through targeted planning and research projects was established as an important element of the planning process, consistent with CALFED policy.

B. SRCAF Restoration Priorities

The *Sacramento River Conservation Area Handbook* specifies four priorities for habitat restoration that are consistent with the Goal and Guiding Principles of the SRCAF. These priorities are drawn from the body of scientific knowledge that is summarized in the *Handbook*. The *Handbook* also provides specific directives for the Chico Landing–Colusa Reach which includes the Colusa Subreach in Chapter 5. Ecosystem restoration in the Sacramento River Conservation Area, including the Colusa Subreach, is expected to address four priorities. In the following discussion, each priority is evaluated in regard to the Colusa Subreach, in light of the most current information.

- **Protect physical processes where still intact** – A key consideration is whether a project protects existing processes of erosion, deposition and flooding. There is recognition within the *Handbook* that these natural riverine processes are what creates and replenishes riparian habitat and sustains the succession of plant communities. Therefore, a restoration project consistent with the *Handbook* would normally not include provisions

such as new levees that would divert floodwater or revetment that would eliminate or stall channel meander. The *Handbook* provides the following specific guidance regarding this priority for the Colusa Subreach :

> **Purchase of these areas (inside of the levees) or landowner *participation in voluntary programs should receive the highest priority for protection of a functional riparian ecosystem.*** *Note that clarification is added in brackets*

- **Allow riparian forests to reach maturity** – Projects which protect areas of existing riparian habitat from conversion to other uses are supported by the *Handbook*. This priority relates to both public and private land. The *Handbook* provides the following specific guidance regarding this priority:

  > ***All areas of early succesional stages should be allowed to mature to climax conditions, thus ensuring a wide variety of vegetation types.***

- **Restore physical and successional processes** – Projects which restore natural riverine processes can help to reestablish habitat by restoring connectivity to the floodplain and facilitating the reworking of land through channel meander. The *Handbook* does not provide definitive guidance regarding this priority for the Colusa Subreach and no projects addressing this priority have been identified to date.

- **Conduct Reforestation activities** – The *Handbook* indicates that horticultural replanting of riparian plants should be a last resort. Where possible, the natural recruitment and reestablishment of native vegetation is preferred. This means replanting of riparian habitat is appropriate only where the natural processes are not sufficient to naturally restore riparian habitat in a reasonable period of time. The *Handbook* provides the following specific guidance regarding this priority:

  > ***The establishment of a wide continuous riparian and valley oak woodland corridor should be the first option under the reforestation priority.***

  In some low-lying areas there is adequate flooding, erosion and deposition so that native vegetation can be recruited naturally. On many higher sites, however, the combination of three key factors effectively frustrates effective natural recruitment of riparian vegetation. These key factors are:

  1. Changes to the flow and flooding regime have reduced the natural capability to recruit riparian vegetation.
  2. Levees and revetment have limited the meander of the river and the resultant creation of new habitat areas.
  3. Competition from nonnative, invasive vegetation has severely limited the establishment of riparian plants.

  Over the past ten years much scientific research has been directed to the restoration of riparian habitat along the Sacramento River. As a result, the scientific basis of habitat restoration has been greatly advanced. The use of detailed soils evaluation, inundation patterns and other baseline data has made the determination of the most appropriate vegetation community and structure much more precise and accurate. The rate of planting success is now relatively high. Additionally, advances in planting and maintenance

techniques have greatly reduced the average cost of restoration. Restoration costs today are generally in a range of from $2,500 to $5,000 per acre, including a three-year maintenance period. The range in cost is due to variations in site-specific costs including weed control, discontinuation of existing uses, planting design, irrigation, etc. These cost figures are based upon TNC's recent experience as part of several restoration projects along the Sacramento River.

C. Ecosystem Approach to Habitat Management

The SRCAF, TNC and the CALFED Program all support an ecosystem approach to the restoration and management of riparian habitat along the Sacramento River. This is the concept of achieving species management objectives by sustaining and enhancing the fundamental ecological structures and processes that contribute to the well being of the communities and species that comprise the ecosystem. The basic objective is to restore and rehabilitate, where feasible, the natural processes that create and sustain the important elements of the ecosystem structure. The ecosystem approach differs fundamentally from the more traditional approach of single-species management, which seeks to manipulate specific environmental factors thought to limit target species populations at levels below management objectives. An example of single-species management would be the direct removal of predators from an environment to reduce predation levels on a target species. In the context of the Colusa Subreach and the entire Sacramento River Conservation Area, the ecosystem approach seeks to restore and support natural riverine processes and resolve impediments to restoration through the application of the best available scientific information and adaptive management of the habitat. The expectation is that restoration of the natural ecosystem will benefit the broadest range of wildlife including special-status species, other native species and game species.

D. Potential Ecosystem Restoration Strategy Components

Under the ecosystem approach various strategies have been implemented by the agencies involved in ecosystem restoration along the Sacramento River. Some common elements of these strategies are reviewed below to facilitate their evaluation and consideration as part of Colusa Subreach Planning. The strategy components that are summarized in this Chapter are not strictly limited to habitat improvement but rather include related public involvement, accessory use and process streamlining concepts. It should be recognized, however, that the components reviewed in this Chapter do not represent the whole of the strategy elements that are currently apply to the Colusa Subreach.

The following review of strategies is presented for information and not as a recommendation for adoption. It is anticipated that through the CSP process, these and additional strategies will be raised and considered by the Advisory Workgroup. Ultimately, this will result in the identification of the most appropriate ecosystem restoration strategy for the Colusa Subreach.

Restoration of Natural Riverine Processes – Restoration of natural riverine processes is the most important component of the ecosystem approach. This includes actions that permit the river to meander and create habitat through the natural processes of erosion and deposition. This involves permitting the river to

erode within most areas of the Subreach and not placing artificial constraints in the way of that process. The *Handbook* recognizes, however, that there are some situations where revetment is required to protect the levee system, existing uses and investments such as buildings, pumping plants, bridges, etc. It is also understood that offsite ramifications of bank protection must be considered.

Reestablishment of the Habitat Corridor – In order to recover wildlife along the Sacramento River, a habitat corridor of adequate size and condition must be reestablished. This involves a combination of preserving existing riparian habitat and infilling with habitat restoration, through either natural recruitment or horticultural planting. Acquisition of land in fee title and conservation easement by public agencies and private conservation organizations from willing sellers is included in the SRCAF program. This permits direct management of the habitat resource and can facilitate the restoration of riverine process.

Within the Colusa Subreach 62% of the existing habitat is privately-owned. This is a major resource and how to best maintain this resource is an important consideration. The restoration of key areas of wildlife habitat on private land could also be part of a successful reestablishment effort. It is recognized, however, that significant economic incentives for private landowners to preserve or restore wildlife habitat are not apparent. Concerns regarding regulatory requirements that might follow restoration activities may also be a limiting factor. Preservation and management of habitat by private landowners is, however, vital to the success of the overall habit reestablishment effort and the identification of incentives for the private conservation of habitat would be of great value.

The Colusa Subreach and the river corridor, in general, have experienced substantial habitat loss and fragmentation. To help deal with the effects of habitat loss and fragmentation, the preservation and restoration of habitat should be directed to sites which are of the greatest value. The *Comprehensive Management Plan for the Sacramento River Wildlife Area* in 2003 incorporated the following three locational priorities for habitat corridor restoration that appear to be relevant to the Colusa Subreach.

1. The assembly of large, contiguous areas, with high interior to edge ratios.
2. The preservation and restoration of sites which fill gaps and expand corridors of protected habitat.
3. The preservation of sites with significant existing habitat value.

An additional priority that should be considered is, “The acquisition of sites that provide or increase the opportunity for the restoration of natural riverine process.” It is reasonable to expect that these priorities could result in the greatest ecosystem benefit for the resources expended.

Control of Nonnative, Invasive Plant Species – The control of nonnative, invasive plant species is an important element of the maintenance and restoration of riparian habitat. Where allowed to proliferate, invasive species can come to dominate a site and preclude the recruitment of native riparian vegetation. In so doing they may greatly diminish the habitat value for wildlife. Due to the prevalence of invasive species in the other areas of the river corridor and the interconnections that exist through flood flows, the control of invasive species management is a difficult challenge that requires a coordinated approach.

Eradication activities such as those taking place on US Fish and Wildlife Service lands higher in the watershed are desirable, as part of the maintenance of the

habitat in the Colusa Subreach. Controls may involve mechanical removal, chemical control, burning or other methods. Control or eradication of invasive species should also continue to be a standard part of any future restoration planting projects.

Restoration Planting – The replanting of riparian vegetation will likely be required to restore some portions of the Colusa Subreach to native riparian habitat. The preferred method of restoration is to permit natural processes to restore the riparian habitat. In portions of the Subreach, such as low lying locations that are frequently inundated, successful natural recruitment of riparian vegetation continues to occur. The river is still actively reworking these areas and creating new habitat. Unfortunately, natural recruitment will not restore all sites in the foreseeable future to help recover wildlife species

Recent analysis has identified certain high terrace sites along the Sacramento River that have not recruited substantial native riparian vegetation even though they have been open and unfarmed for over 25 years (California Department of Fish and Game, 2003). In these cases, nonnative plants such as yellow starthistle and Johnson grass with low habitat value have dominated the sites and precluded meaningful recruitment of native plants. For these types of higher sites there is no reasonable expectation that the remaining natural processes will generate prime riparian habitat communities in the foreseeable future.

Horticultural planting of native vegetation is required in these situations so that the quantity and quality of habitat can be increased in the near future. The objective of both the state and federal Endangered Species Acts is to foster positive steps that will result in viable populations of special-status species in the foreseeable future so that species can be recovered and delisted. Restored habitat has been shown to support substantial populations of indicator species such as songbirds and Valley Elderberry Longhorn Beetles in relatively short periods of time. For these higher sites where the reduced natural processes (erosion, deposition and flooding) cannot support natural regeneration of riparian habitat horticultural planting of riparian vegetation is necessary to help recover special-status species.

Over 4000 acres of riparian habitat have been restored along the Sacramento River between Red Bluff and Colusa. Only a small portion of this total restoration, 124 acres, has occurred within the Colusa Subreach. Restoration has taken place at three tracts within the Sacramento River Wildlife Area, which is managed by the California Department of Fish and Game. These three tracts are described on Table 8 and depicted on Figure 16.

Table 8. Existing Habitat Restoration Tracts

Property	River Mile	Year	Acres
Princeton- East Subunit	164 L	1992	44
Princeton - South Subunit	162.5 R	2001	34
Moulton – North Subunit	156.5 L	2001	46
Total -			124 acres

Source: Comprehensive Management Plan for the Sacramento River Wildlife Area

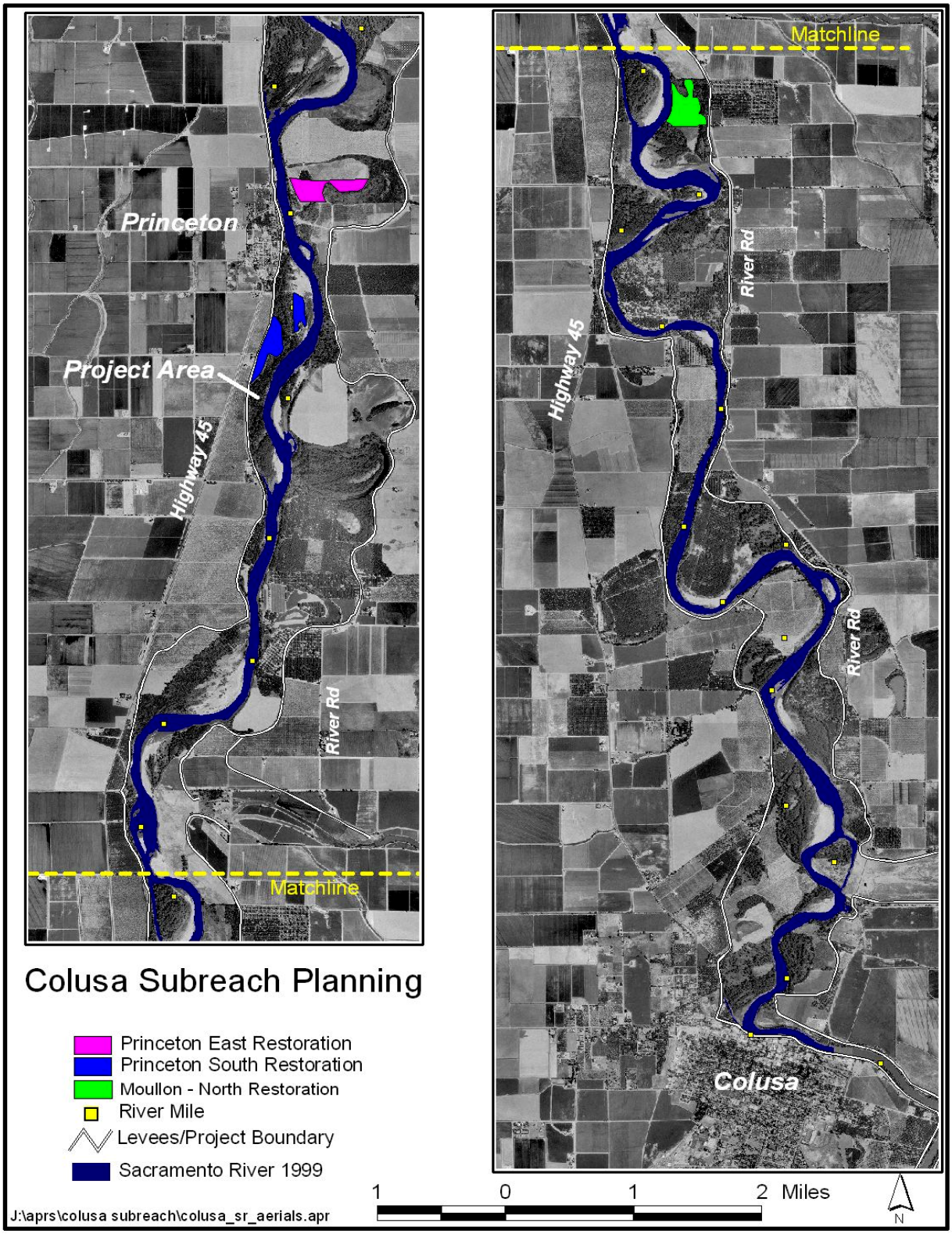

Figure 16. Existing Habitat Restoration Tracts

Source: California Department of Fish and Game

On each site it was determined that natural processes alone would not restore the area to riparian habitat of sufficient value in the near term. Restoration planting followed a detailed baseline analysis of the site characteristics and the development of a plan for the planting and initial maintenance of the area. The planting was limited to native species in a design that responded to existing site characteristics that included soils, drainage, inundation frequency and surrounding land uses. Irrigation was provided for a three-year establishment period. After three years the irrigation was discontinued because the root systems were adequately established to draw necessary moisture from groundwater (Alpert et. al., 1999).

Public Involvement in Habitat Management Planning – In recent years public agencies have expanded their efforts to involve the public in general and local interests specifically in planning for the management of the properties. This outreach is strongly encouraged by the SRCAF. Both the California Department of Fish and Game and the US Fish and Wildlife Service consulted local interests and held multiple public input meetings in the vicinity of the Colusa Subreach as part of their planning processes. While the California Department of Parks and Recreation has not conducted recent planning in this Subreach, it did include a substantial public input process as part of its development of a new general plan for the Bidwell-Sacramento River State Park near Hamilton City. Colusa Subreach Planning will take public involvement in restoration planning to a new level bringing public agencies, the SRCAF and TNC together with many local interests.

The recent experiences of each of these agencies suggest that a range of stakeholder perspectives can be expected in regard to habitat management. This range of input will reflect the variety of interests in the local area and California in general. Some inputs will likely conflict with others but some common themes can be expected to be heard that can help direct the future planning of habitat management.

Coordination with Other Area Landowners – Landowner coordination is stressed by the SRCAF and is an important provision in the habitat management plans prepared by the Department of Fish and Game, the Department of Parks and Recreation and the Fish and Wildlife Service. This coordination normally involves consultation as part of the planning of habitat restoration projects and communication as part of ongoing management of properties. There is a realization that activities on land managed for habitat may affect adjoining land and that the reverse is true.

The SRCAF facilitates the coordination of activities with neighbors as well as the public review of plans and projects related to ecosystem restoration. It has developed specific provisions for communication with neighboring owners and local governments as well as review through its Technical Advisory Committee (TAC) and Board of Directors. A Good Neighbor Policy was initially adopted by the SRCAF Board of Directors but remaining sections related to incidental take, grievance procedure and a self-mitigating area are unresolved. As noted in Chapter V, this lack of resolution is a matter of frustration to some local interests.

Planning for Compatible Public Recreation – Riparian habitat has been and will continue to be attractive for recreation uses that appeal to a substantial segment of both the local and regional population. The public ownership of land for ecosystem restoration offers the potential for increased public access and utilization of this recreation resource. Public input also indicates that such recreation is considered

to be a visible and tangible return on the taxpayer investment directed toward habitat conservation along the Sacramento River.

Planning for public recreation by been an important focus of activity within the Sacramento River Conservation Area over the past three years. Chico Landing Subreach Planning included the *Sacramento River Public Recreation Access Study* that developed an information base for subsequent planning efforts. Both the Department of Fish and Game and the Fish and Wildlife Service identified recreation uses that are compatible with their wildlife habitat conservation missions and identified policies and improvements that they would pursue, in order to better support public recreation use of the properties that they manage. The recent general plan for the Bidwell-Sacramento River State Park had public recreation as a central focus. All these processes identified the fact that the increased populations of fish and wildlife, that will result from habitat conservation, will support more and better public recreation opportunities on the more than13,400 acres of land that will be available for public use along the middle Sacramento River.

Colusa Subreach Planning offers the potential to draw from these previous planning programs, obtain specific public input and target recreation needs that can be coordinated with habitat conservation. In this way compatible public recreation use could be integrated into the overall ecosystem restoration strategy that will be developed for the Subreach. The planning of specific restoration tracts additionally offers the potential to plan for public access and use (trails, parking areas, etc.) that will permit the public to directly experience the benefits of habitat conservation. For example, areas could be reserved for future public parking. Also, primitive roads for the initial maintenance of restoration plantings could be located so that they could serve as trails to desirable public use areas such as gravel bars in the future.

Regulatory Streamlining – The concept of streamlining regulations is a key consideration within the *Handbook*. The Sacramento River corridor is a rich but fragile ecosystem that is affected by numerous local, state and federal regulations designed to protect air quality, water quality and wildlife. These standards are administered by many different agencies; and meeting these various regulations can be complex, time consuming and expensive. These compliance costs impact agriculture, flood control, infrastructure, recreation and ecosystem restoration.

The *Handbook* proposes a regulatory consistency/streamlining program that should include the following elements:

- Mitigation requirements
- Interagency consistency
- Consolidation of application forms
- Mitigation banking

This interest in streamlining is applicable to the entire Sacramento River Conservation Area and efforts are underway to address these concerns, principally through the Landowner Assurances Committee of the SRCAF. While it is not practical or desirable for CSP to duplicate or replace these efforts, there may be the opportunity to address subreach-specific concerns or develop demonstration projects as part of CSP. The Landowner Assurances Committee of the SRCAF has been investigating concepts for regulatory streamlining supported by a Legaci grant from the Great Valley Center. This effort involves top managers of public conservation agencies, such as the State Department of Fish and game and the US Fish and Wildlife Service, as well as some members of the Advisory Workgroup.

Specific details of a streamlining proposal have not yet been finalized but it has been suggested that the Colusa Subreach might provide a real world opportunity to take a streamlining concept from the theoretical to reality.

One such opportunity that is proposed as part of CSP is the development of a Programmatic Safe Harbor Agreement (PSHA) related to the Valley Elderberry Longhorn Beetle (VELB). The proposed agreement could permit the planting of elderberry plants within Colusa Subreach restoration areas to expand the existing baseline of elderberry plants. This would expand the habitat available to the VELB. A PSHA could then permit flood control agencies, or any other public or private entity who wanted to join the Safe Harbor Agreement, to remove elderberry plants as part of their normal activities. Flood control agencies have indicated that this "incidental take" ability would improve their maintenance of the levee system by reducing cost and saving time.

Other Strategies – Additional concepts and new ideas are expected to be suggested, discussed and evaluated as part of Colusa Subreach Planning that may be reflected in the final ecosystem restoration strategy for the Colusa Subreach.